

REMARKS

35 U.S.C. § 103 Rejections

The Examiner has rejected claims 1-13 and 15-30 under 35 U.S.C. § 103(a) as being unpatentable over Huang in view of Hanrahan. Applicant maintains that the claims are patentable over Huang and Hanrahan.

In support of Applicant's assertion that the claims are patentable, Applicant submits herewith an Affidavit signed by all of the inventors of the present patent application. The Examiner is requested to refer to the Affidavit for the reasons why Applicant believes that the claims are allowable over Huang and Hanrahan. The inventors are persons skilled in the art, and submit that it would not have been obvious, to a person skilled in the art, to combine Huang and Hanrahan to obtain the invention as claimed and for the reasons stated.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 1-13 and 15-30 under 35 U.S.C. § 103(a) as being unpatentable over Huang in view of Hanrahan.


Applicant respectfully submits that the present application is in condition for allowance. If the Examiner believes a telephone conference would expedite or assist in the allowance of the present application, the Examiner is invited to call Stephen M. De Klerk at (408) 720-8300.

Please charge any shortages and credit any overages to Deposit Account
No. 02-2666. Any necessary extension of time for response not already requested
is hereby requested. Please charge any corresponding fee to Deposit Account
No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: December 1, 2004



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Attorney's Docket No.: 042390P12141

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Ashay A. Dani, et al.

Application No.: 10/038,334

Filed: October 18, 2001

For: THERMAL INTERFACE MATERIAL
AND ELECTRONIC ASSEMBLY
HAVING SUCH A THERMAL
INTERFACE MATERIAL

Examiner: Sheeba Ahmed

Art Unit: 1773

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AFFIDAVIT

Dear Sir:

We, Ashay A. Dani, Paul A. Koning, Saikumar Jayaraman, and Christopher L. Rumer, having personal knowledge of the facts set forth herein, hereby declare as follows:

1. We are co-inventors of the above-identified patent application entitled "THERMAL INTERFACE MATERIAL AND ELECTRONIC ASSEMBLY HAVING SUCH A THERMAL INTERFACE MATERIAL."

2. The Examiner has rejected claims 1-13 and 15-30 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,062,896 issued to Huang, et al.

("Huang") in view of U.S. Patent No. 5,945,217 issued to Hanrahan ("Hanranhan").

Ashay A. Dani, et al.
Application No.: 10/038,334

Examiner: Sheeba Ahmed
Art Unit: 1773

3. When developing the thermal interface material of the present invention, it was not immediately obvious to us that we could add solder particles in the thermal interface material. Solder typically has a thermal conductivity of only about 30-40 W/mK. Metal particles, such as the filler particles, have a much higher thermal conductivity, typically in the region of about 300-400 W/mK. We did not initially believe that it would be possible to remove some of the high thermal conductivity material, and replace the removed material with solder having a much lower thermal conductivity. Our initial belief was that the overall thermal conductivity would be lowered by the solder material. It was only after we tested the thermal interface material that included the solder material that we realized that the solder material did not reduce the overall thermal conductivity. It is now our belief that the solder material provides thermal links between the filler particles, and therefore improves the thermal conductivity of the overall structure.

4. It is the Examiner's belief that the invention as claimed is obvious in view of Huang, which discloses a solder material. One of ordinary skill in the art would not be inclined to consider Huang for purposes of constructing a thermal interface material for thermal coupling of an electronic component to a thermally conductive member. As mentioned, a solder material typically has a thermal conductivity of only about 30-40 W/mK. One skilled in the art would be steered away from the solder material in Huang because of the relatively low thermal conductivity. One skilled in the art would only consider Huang in situations where high thermal

conductivity is not required. The solder material of Huang is used for forming electrical contacts.

5. What should further be noted is that the paste of Huang, which is used for making electrical contacts, requires that the paste be reflowable. See column 5, line 30. The material can thus be heated to allow it to be reworked. See column 5, line 54.

6. The opposite is required for the material of the present invention, which is used as a thermal interface material. In a thermal interface material, it is required that the material be sufficiently stable at high temperatures. For this purpose, filler particles 20 are included in the thermal interface material 10. Without the filler particles 10, the thermal interface material 10 may tend to flow out from between the electronic component 12 and the thermally conductive member 14 during thermal cycling and/or when exposed to high humidity. The filler particles 20 provide the necessary strength to prevent the thermal interface material 10 from flowing out from between the electronic component and the thermally conductive member 14 under such conditions. The filler particles 20 thus keep the thermal interface material 10 intact during adverse stress and thermal conditions. See page 8, lines 8-16.

7. Huang thus teaches away from the present invention because the paste of Huang should be reflowable and workable at high temperatures, whereas the material of the present invention should remain stable at high temperatures. Hanrahan describes a thermally conductive composite article having a PTFE material which has disposed therein thermally conductive particles, and a phase change material. One skilled in the art would not combine Huang with Hanrahan because

the materials of Huang and Hanrahan serve different purposes, and the material requirements are opposite to one another, in that the material of Huang should be reflowable, whereas the material of Hanrahan should be stable. The references are thus incompatible with one another.

8. We, accordingly, respectfully submit that claims 1-13 and 15-30 are patentable in view of Huang and Hanrahan.

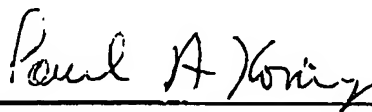
We hereby declare that all statements made herein are of our own personal knowledge and are true, and that all statements made on information and believe are believed to be true; and that these statements were made with knowledge that willful, false statements and the like may jeopardize the validity of the patent application, or any patent resulting therefrom.

Respectfully submitted,

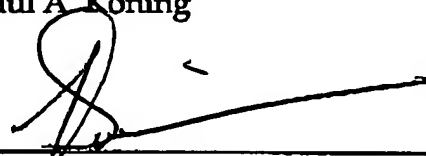
Date: November 18, 2004


Ashay A. Dani

Date: November 18, 2004


Paul A. Koning

Date: November 18, 2004


Saikumar Jayaraman

Date: November 17, 2004


Christopher L. Rumer

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